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and depth that can be very imperfectly suggested in a brief review. No class of readers will get so much profit and satisfaction from the work as those who desire to know the latest word that science has to offer in explanation of the causes and principles underlying the phenomena of plant activity in both health and disease, and who desire the information presented in a luminous, concise manner, and so far as possible, in untechnical language.

When the point of view of the author becomes the prevalent point of view both of the public and the investigator, great advantage will accrue to all who deal with plants, and this work should be an important factor in hastening the time.—J. C. ARTHUR.

### The Cyclopedia of American horticulture.

THE fourth and last volume of Bailey's *Cyclopedia of American horticulture* has just appeared.<sup>2</sup> The scope and quality of this great work have been spoken of in reviews of the preceding volumes.<sup>3</sup> The editor hopes that this Cyclopedia will never be revised, "for it is the purpose of the book to make a record of North American horticulture as it exists at the opening of the twentieth century." It is expected that subsequent progress will be recorded in a series of supplements with cumulative indexes, the manuscript for the first two of which is already prepared. Numerous important genera are presented in the usual way, notable among which are *Rosa*, *Rubus*, *Salix*, *Saxifraga*, *Sedum*, *Selaginella*, *Spiraea*, *Tulipa*, *Vitis*. These and other genera are all treated in the usual way, the synoptical keys of the cultural species being followed by descriptions of treatment, regions of cultivation, etc. The treatment of roses is especially noteworthy, the editor venturing the opinion that this subject will probably be consulted oftener than any other in the Cyclopedia. In order to make it worthy of such a place the treatment is particularly full. After the usual scientific synopsis, including fifty species, the horticultural classification is presented, followed by a discussion of the treatment of roses, their adaptation to different regions and all other points of view that might be of interest to those cultivating roses. Perhaps the most notable articles dealing with fruits are those upon the strawberry and tomato.

Aside from such papers there are noteworthy articles upon *Railroad gardening*, *Rock gardens*, *Seedage*, *Spraying*, and *Storage*. By the name *Seedage* the editor refers to the propagation of plants by seeds and spores, and after the general treatment there is a section upon *Seed breeding* by W. W. Tracy, and one upon *Seed testing* by G. H. Hicks. Under the general title

<sup>2</sup> BAILEY, L. H., *Cyclopedia of American horticulture*, etc. Vol. IV. R-Z. 4to, pp. xxx + 1487-2016, *figs.* 2060-2800, *pls.* 32-50. New York: The Macmillan Company. 1902. \$5.

<sup>3</sup> BOT. GAZ. 29:282; 30:277; 31:436.

*Storage*, presented by the editor, there is an account of *Cold storage* by L. C. Corbet, and of *Refrigerator cars* by J. H. Hale.

Aside from the taxonomic presentation of many genera, perhaps the most interesting articles to botanists are *Teratology*, presented by C. R. Barnes; *Trees*, presented in all their aspects by various writers; and *Winter protection*, described and illustrated by W. C. Egan and B. M. Watson.

Professor Bailey is to be congratulated upon the completion of this work, especially upon the peculiar features it possesses in comparison with the ordinary cyclopedias dealing with horticultural material. Its chief features, as they stand out in the mind of the editor, are that it represents a living horticulture, rather than a compilation of odds and ends selected from other encyclopedias; that it contains synoptical keys that enable the reader to name the species; that the leading articles are signed and represent the contributions of more than 450 persons; and that throughout the whole presentation one detects no rigid conception of plant forms, but feels the drift of an evolutionary motive. That such a work should have been begun, so far as actual writing is concerned, in January 1899, and the last proof read December 31, 1901, speaks well for the organizing power and the capacity for work of its editor and his staff. The statistics show that the total number of entries is 4357; the number of genera described is 2255; the number of species fully described is 8793, of which 2419 are native to North America north of Mexico.—J. M. C.

### Physiology in the laboratory.

TO STUDY the plant in action is to become acquainted with the most interesting phase of the science of botany. It is a part of the subject that appeals especially to the young student. But to make intelligent progress, to look into the more recondite processes without elaborate apparatus, and to proceed without undue loss of time and check to enthusiasm requires a good guidebook. Even under an excellent instructor a handbook is advantageous. A work that meets the requirements for a laboratory manual of physiology for the beginner has recently been issued from the press of Longmans, Green & Co., prepared by Dr. Daniel T. MacDougal,<sup>4</sup> director of the laboratories of the New York Botanical Garden.

The work is perspicuous, concise, up to date, and requires only simple apparatus, easily obtained by most colleges and high schools, and in part no apparatus at all. The whole ground of physiology is covered: growth and growth movements, reproduction and germination, movements of gases and liquids, nutrition of green plants, parasites and saprophytes, respiration, digestion, stimulation, and correlation.

The text is more than a set of directions for performing experiments, for

<sup>4</sup>MACDOUGAL, DANIEL TREMBLY, *Elementary plant physiology*. New York: Longmans, Green & Co. 1902. 12mo, pp. xi+138, with 108 text cuts.